

013 33. (Twice Amended) The implant of Claim 28 wherein the coating further includes a plurality of nano-scale ceramic bilayers including a hardness-imparting bilayer and a toughness-imparting bilayer.

#### REMARKS

##### **Response to Rejections Under 35 USC §112**

The Examiner rejected claims 13, 16, 19, and 30 under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regards as the invention. Applicant believes that the above amendments to the rejected claims obviate the problems referred to by the Examiner.

##### **Response to Rejections Under 35 USC §103**

The Examiner rejected claims 1-4, 7, 8, 12, 13, 16, 18, 19, 28, 31, and 33 under 35 USC §103(a) as being unpatentable over Aita et al (US 5,472,795) in view of Davidson (US 5,782,910). The Examiner also rejected claims 1, 3, 4, 11, 12, 16, 28, 30, and 31 under 35 USC §103(a) as being unpatentable over Davidson (US 5,649,951) in view of Davidas (US 4,326,305). The Examiner has further rejected claims 1, 3, 4, 11, 12, 16, 28, and 31 under 35 USC §103(a) as being unpatentable over Davidson (US 5,649,951) in view of Davidson (US 5,782,910).

Applicant has amended the above claims to clarify the invention on which applicant seeks protection. Specifically, the claims are directed to a coating or a device with a coating having a bilayered inner coating and outer coating of aluminum nitride which converts to aluminum hydrate or aluminum hydroxide in an oxygen containing medium such as water. None of the cited references refer to or suggest this

combination of features. Moreover, there is no suggestion of a bilayer formed of different ceramic components as set forth in claim 1 and particularly ceramic materials of zirconia and alumina.

### **Response to Allowable Subject Matter**

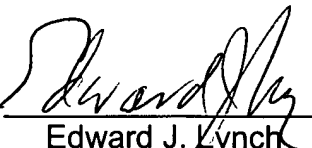
The applicants note with appreciation the Examiner's allowance of claims 21-27 and the Examiner's indication that claims 9, 10, 14, and 15 are directed to patentable subject matter and would be allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims.

A marked-up copy of the above amendments noting changes made to the specification and the claims is attached.

Applicant believes that the pending claims are in allowable condition.

Reconsideration is respectfully requested.

Respectfully submitted,

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IN THE CLAIMS

MARKED-UP COPY INDICATING CHANGES

Please amend claims 1, 3-4, 7, 8, 14, 18, 19, 21, 24, 25, 27, 28, 30 and 33 to read as follows:

1. (Twice Amended) An intracorporeal device having a protective self-repairing coating on a surface thereof, comprising:
  - a. an inner coating component having at least one [layer] bilayer formed of different ceramic [material] materials on the surface of the device; and
  - b. an outer coating component having at least one layer less than 100 nm thick formed of [a water swellable ceramic material selected from the group consisting of] aluminum nitride[, zirconium nitride and hafnium nitride] on the inner coating component which forms a water swellable material in an oxygen containing medium.
3. (Three Times Amended) The intracorporeal device of Claim 1 wherein the ceramic [material] materials of the at least one [layer] bilayer of the inner coating component [is] are selected from the group consisting of zirconia, titania and alumina.
4. (Three Times Amended) The intracorporeal device of Claim 1 wherein the water swellable [ceramic] material [forms] is [a] aluminum hydrate or aluminum hydroxide [in the presence of an oxygen containing environment].
7. (Three Times Amended) The intracorporeal device of Claim 1 wherein

[the] individual [layers] bilayers of the inner coating component are about one to about 100 nanometers thick.

8. (Twice Amended) The intracorporeal device of Claim 1 wherein the individual [layers] bilayers of the inner coating are about one to about 50 nanometers thick.

13. (Twice Amended) The intracorporeal device of Claim [5] 1 wherein each of the inner and outer coating components have a thickness in a range from about 1 to 50 nm.

14. (Twice Amended) The intracorporeal device of Claim 1 wherein the at least one [layer] bilayer on the surface of the device includes a [plurality of] nano-scale [ceramic layers independently forming a] hardness-imparting ceramic coating layer and a nano-scale toughness-imparting ceramic coating layer.

16. (Twice Amended) The intracorporeal device of Claim 1 wherein the outer coating component has a thickness in the range from about 1 to less than [about] 100 nm.

18. (Twice Amended) A nanostructure protective self-repairing coating for a substrate, the coating comprising an outer coating component less than 100 nm thick comprising a compound selected from the group consisting of aluminum nitride, zirconium nitride and hafnium nitride which is capable of forming a hydrate or hydroxide compound upon contact with an oxygen containing environment and an inner coating component secured to the substrate comprising [a] at least one bilayer formed of one layer of a first ceramic [materials] material and a second layer of a second ceramic material different from the first ceramic material.

19. (Twice Amended) The coating of Claim 18 wherein the compound of the outer coating component comprises [an] aluminum [compound] nitride.

21. (Twice Amended) An intracorporeal implant, comprising:  
a substrate selected from the group consisting of metals, polymers,  
and a combination thereof; and  
a protective coating thereon having a plurality of coating components  
comprising

a first coating component having [a plurality of bilayers] at least one bilayer  
wherein each layer is formed of a material selected from the group consisting of  
zirconia and alumina;

a second coating component disposed on the first coating component having  
[a plurality of bilayers] at least one bilayer with each layer formed of a material  
selected from the group consisting of zirconia and titania; and

a third coating component disposed on the second coating component  
formed of a compound which has microcrystallinity and which is capable of forming  
a hydrate or hydroxide upon contact with an oxygen containing environment.

24. (Twice Amended) The implant of Claim 21 wherein the compound  
selected is aluminum nitride which forms [selected from the group consisting of]  
aluminum hydroxide, aluminum hydrate, [and] or mixtures thereof.

25. (Twice Amended) [(The implant of Claim 21 wherein the coating  
thickness is in a range from about 1 to about 100 nanometers.

27. (Twice Amended) An intracorporeal implant[, comprising:] which has  
a substrate selected from the group consisting of metals, polymers, and a

combination thereof [having] with a protective coating thereon[, comprising:]  
formed of a plurality of nano-scale ceramic layers with each nano-scale layer  
formed of one or more compounds selected from the group consisting of zirconia,  
titania, alumina, and aluminum nitride.

28. (Twice Amended) An intracorporeal implant[, comprising] which has a  
substrate selected from the group consisting of metals, polymers, and a  
combination thereof, [and having] which has an inner coating component secured  
to the substrate with at least one bilayer formed of one layer of a first ceramic  
material and a second layer of a second ceramic material different from the first  
ceramic material and which has a protective self-repairing coating thereon [which  
has] with a self sealing outer coating component having a thickness of less than  
100 nm, having nano-crystallinity and [comprising] formed of a compound [which  
is] selected from the group consisting of aluminum nitride, zirconium nitride and  
hafnium nitride and [which is] capable of forming a hydrate or hydroxide compound  
upon contact with an oxygen containing environment.

30. (Twice Amended) The implant of Claim 28 wherein the [aluminum]  
compound is aluminum nitride.

33. (Twice Amended) The implant of Claim 28 wherein the coating  
further includes a plurality of nano-scale ceramic [layers] bilayers [independently  
forming] including a hardness-imparting [coating component] bilayer and a  
toughness-imparting [coating component] bilayer.